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(54) MIS TYPE SEMICONDUCTOR ELEMENT

(57) Abstract:

PURPOSE: To reduce the influence of a boundary level upon element characteristics and facilitate P-type inversion by specifying the relation between the ionizing potential of a semiconductor and the electron affinity of an organic molecule in an MIS type semiconductor element.

CONSTITUTION: A thin film containing organic molecules is employed as an insulator in an MIS type element. The insulator is composed of the thin film containing organic molecules which conform to the relation $IPS < X_1 + 0.3$, wherein X_1 (eV) denotes an electron affinity of the organic molecule and IPS (eV) denotes the ionizing potential of a semiconductor. For instance, first, an AuGe ohmic electrode 12 is formed on a backplane of an N-type GaAs substrate 11 doped with Si or the like and the surface of the substrate is cleaned. Then, about 20 layers of LB films 13 of mixture of 7,7,8,8-tetracyanoquinodimethane (TCNQ) and arachidic acid are applied to the GaAs substrate 11. After that, an Al electrode 14 is formed on the LB films 13 by evaporation. In the C-V characteristics of an MIS capacitor, the surface of the GaAs substrate 11 is inverted by a reverse bias of about 1.5 V. Incidentally,

a leakage current is very small in the range of the reverse bias of 0~10 V.

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